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EVALUATION OF SHAVERS FORK MINE SEALS.

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Environmental Protection Agency
Norton, West Virginia

September 1971

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EVALUATION OF SHAVERS FORK MINE SEALS

By

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Mine Drainage Pollution Control Activities
Office of Research and Monitoring
Environmental Protection Agency
Norton, West Virginia

September 1971

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EVALUATION OF SHAVERS FORK MINE SEALS

Summary and Conclusions

The U. S. Bureau of Sport Fisheries and Wildlife Fish Hatchery at Bowden, West Virginia, reported a fish kill in their hatchery in the spring of 1966. The kill was reportedly from acid mine drainage flushing out of several abandoned underground coal mines at the head of Taylor Run, a tributary of Shavers Fork.

The West Virginia Department of Mines air sealed several small underground mines in the Taylor Run, Red Run, and Fishing Hawk mining areas by constructing cement block-type air and dry seals at the portals. Since November 1967 seasonal samples have been collected at these seals and analyzed. Reduction in mean acid loads of 60 to 80 percent, iron 25 percent, and sulfur loads of 45 to 51 percent have been observed at Big Knob and Savage mine seals located on Taylor Run Watershed. In general, the decrease in load has been due to a decrease in discharge and not a significant improvement of water quality. Mean loads measured on Taylor Run at its mouth and also at other seal sites show an increase in acid, iron, and sulfate loads. These results are not considered reliable because insufficient background material was collected before sealing. In addition, experienced technicians were not always available to collect samples and measure stream flows. Other areas such as Red Run show no change or a slight increase in ion concentrations in the mine water.

Inspection of backfill material (or protective covering) placed in front of the block seals indicates no seepage in these areas. The highwall and outcrop in the vicinity of the old portals appear to be solid and in good condition.

Specific conclusions drawn from this study were:

1. At the Big Knob and Savage mines, air sealing portals to small abandoned underground mines significantly reduced the discharge, resulting in reduced loads of acid, iron and sulfate.

2. After four years, no apparent leaks have occurred in the vicinity of the sealed portals.

3. Results were inconclusive at some seals due to lack of trained field personnel to collect samples and measure flow, and lack of data collection prior to sealing.

4. Maximum acid mine drainage occurred during periods of spring flushouts.

5. Organic acid resulting from heavy foilage decay contributed to pollution of Shavers Fork.

6. Shavers Fork is a stream with very little buffering capacity, therefore even small quantities of acid mine drainage pollution will endanger the equilibrium of the stream.

7. None of the discharges, after sealing, would meet the West Virginia or Pennsylvania discharge standards.

Background

Early in 1966 the U. S. Bureau of Sport Fisheries and Wildlife Fish Hatchery at Bowden, West Virginia, reported a fish kill in the hatchery resulting from acid mine water flushing out of several abandoned underground mines at the head of Taylor Run, a tributary to Shavers Fork.

The West Virginia Department of Mines immediately made plans to air seal all known abandoned deep mines which were discharging acid mine drainage in the Taylor Run (Area 1), Red Run (Area 2), and Fishing Hawk (Area 3) areas, all tributaries to Shavers Fork. These areas extended from the Bowden Fish Hatchery to Spruce, West Virginia, a distance of 50 river miles, and drain approximately 140 square miles. See Figure 1 for location of these areas. Coal most predominately deep mined in the areas was the Sewell seam. A double-entry system, room and pillar method, of underground mining was employed and consisted of small mining complexes. Minimum surface mining was done on the contour outcrop of the coal seam in the vicinity of the portals.

Masonry block seals were installed at the following mine sites:

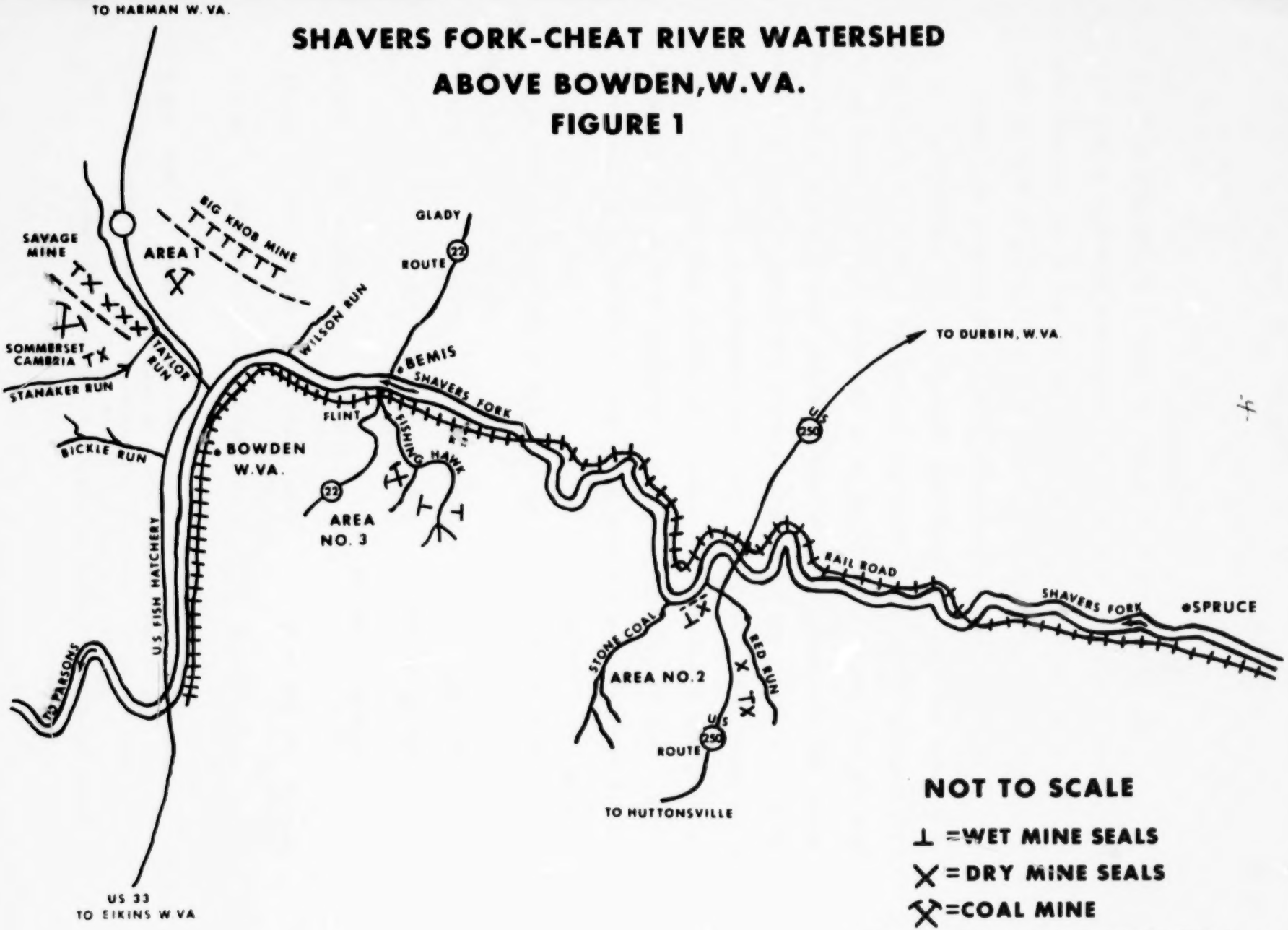
		Date Constructed	Coal Seam
Area 1 - Big Knob (See Figure 2)	6 Wet Seals*	October 1967	Sewell
Savage Mine***	1 Wet Seal 1 Dry Seal**	November 1967	Sewell
Summerset Cambria Mine	1 Wet Seal 1 Dry Seal	September 1967	Sewell
Area 2 - Red Run Mine (See Figure 3)	2 Wet Seals 2 Dry Seals	August 1967	Sewell
Area 3 - Fishing Hawk (See Figure 4)	2 Wet Seals	August 1968	Sewell

*Wet Seal - A closure in the portal that allows water to drain from the mine but prevents air from entering.

**Dry Seal - A solid closure in the portal to prevent movement of water and air into and out of the mine.

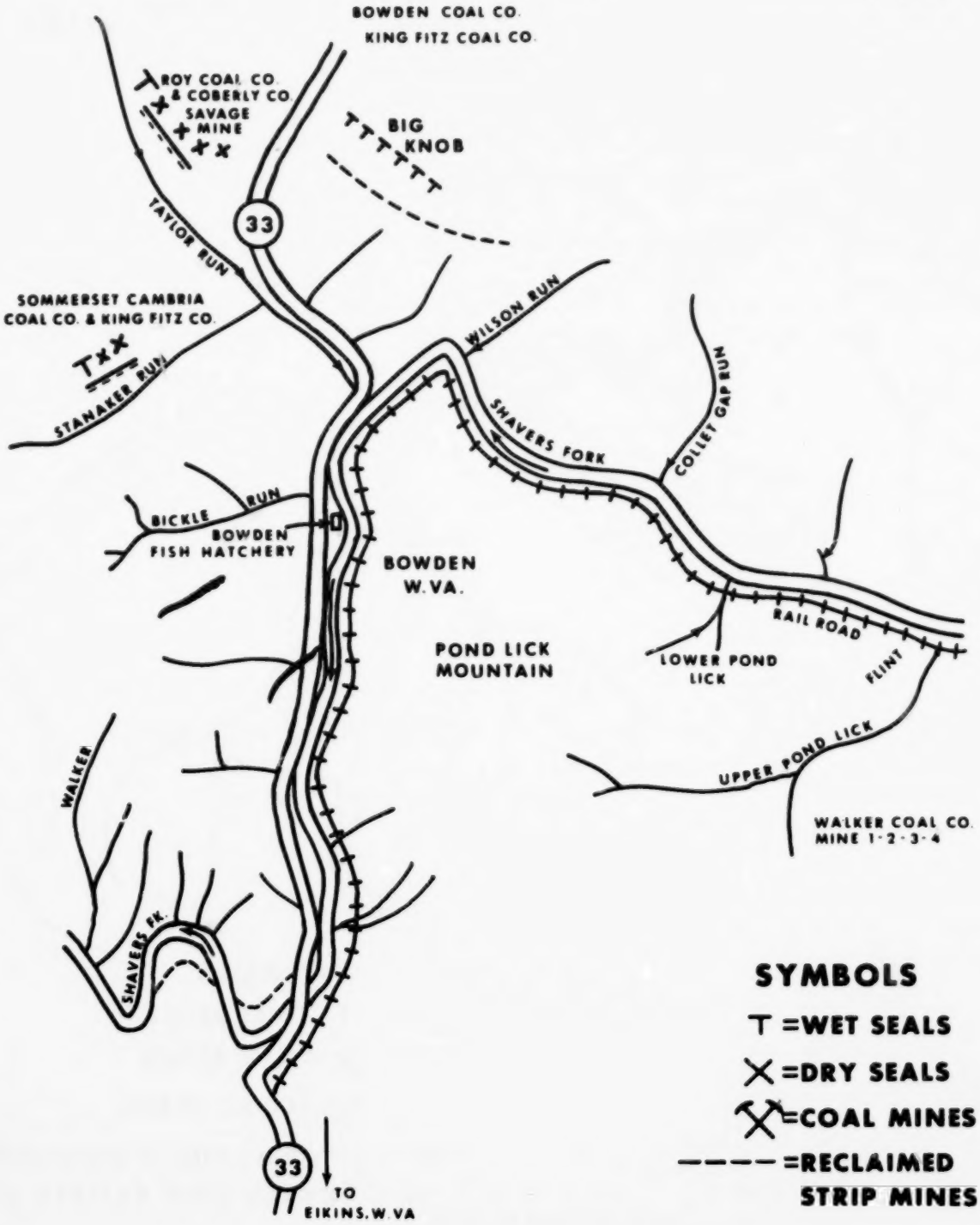
***Note that a nearby intercepting strip mine was reclaimed.

SHAVERS FORK-CHEAT RIVER WATERSHED
ABOVE BOWDEN, W.VA.
FIGURE 1



SHAVERS FORK-CHEAT RIVER
MINE SEALS
AREA 1
FIGURE 2

SCALE: 1 / 62500



SYMBOLS

T =WET SEALS

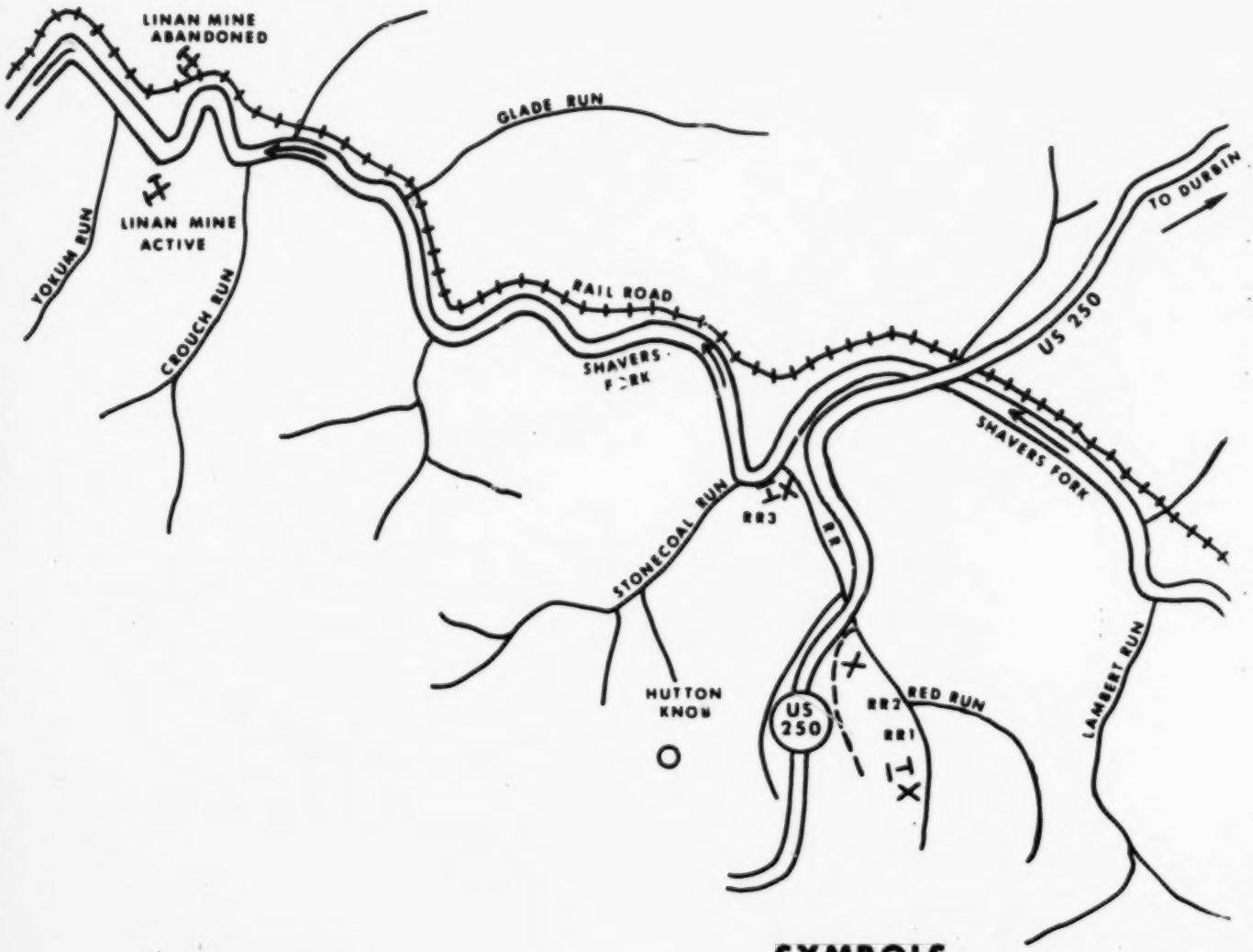
X =DRY SEALS

=COAL MINES

– – – – =RECLAIMED STRIP MINES

SHAVER FORK-CHEAT RIVER
MINE SEALS
AREA 2
FIGURE 3

SCALE: $\frac{1}{62500}$



SYMBOLS

T =WET SEALS

X =DRY SEALS

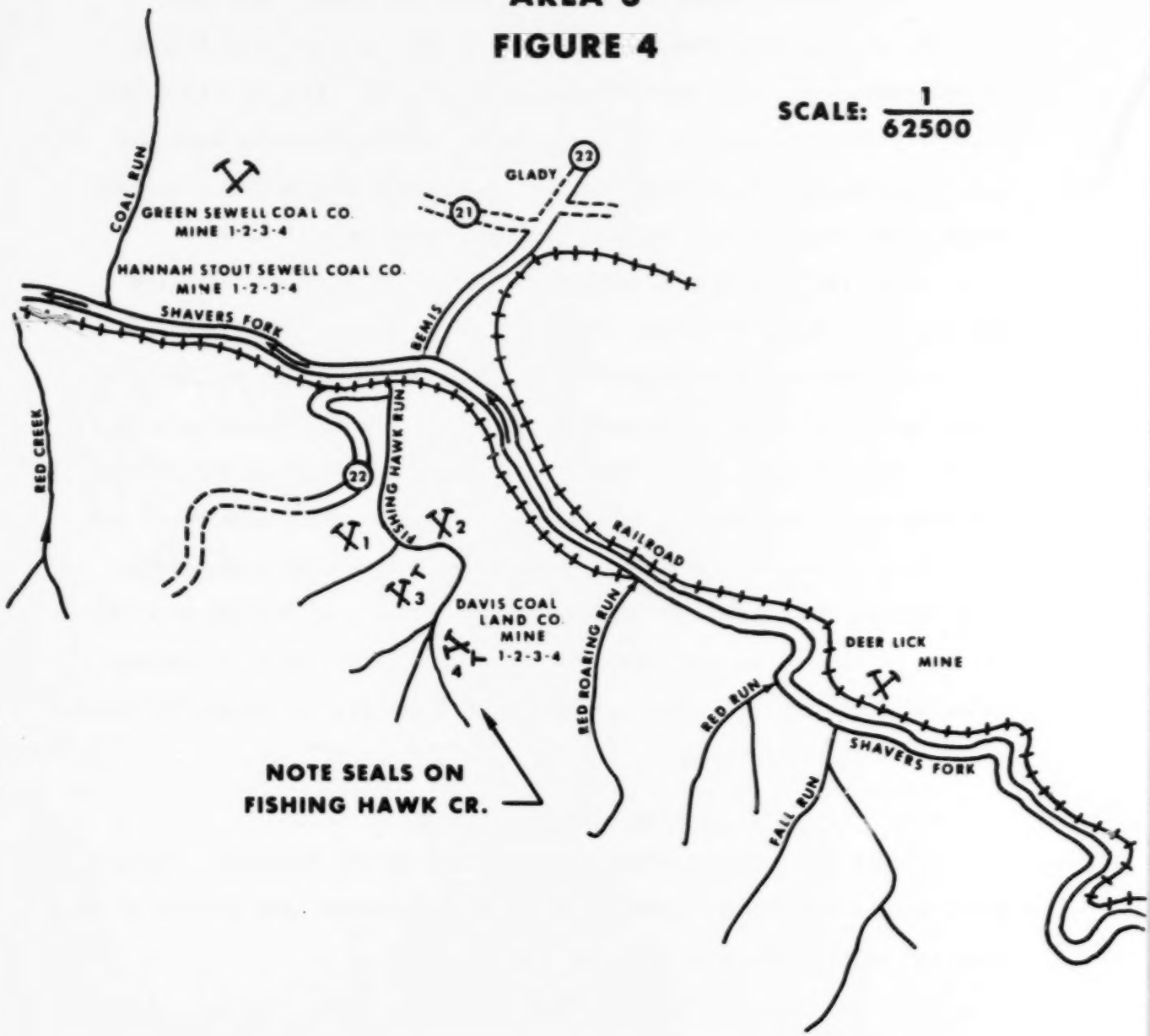
=COAL MINES

– – – – =RECLAIMED STRIP MINES

RR=RED RUN SAMPLE SITES

SHAVERS FORK-CHEAT RIVER
MINE SEALS
AREA 3
FIGURE 4

SCALE: 1/62500



SYMBOLS

T =WET SEALS

X =DRY SEALS

⚒ =COAL MINES

---- =RECLAIMED STRIP MINES

Dry seals, consisting of solid concrete blocks, were constructed in deep mine openings to act as an air seal and divert water to one opening in which wet seals were constructed. Figure 5 is a diagram of a wet seal which allowed mine water to flow from the mine but was to prevent air from entering. All seals were constructed by prison labor under the direction of West Virginia Department of Mines.

In 1967 the Federal Bureau of Sports Fisheries and Wildlife and the Environmental Protection Agency, ter Quality Office,* agreed to assist the West Virginia Department of Mines in collecting and analyzing wate samples at these sites whenever possible. Grab samples were collected seasonally and evaluated by the Water Quality Office Norton Mine Drainage Field Laboratory. The following determinations were made: pH, acid, iron, aluminum, hardness, and sulfates. Discharge measurements were made volumetrically or by flow meters at the time samples were collected. Little or no data were collected at some of the mine openings prior to sealing, therefore, comparison of these data to determine results after sealing is limited.

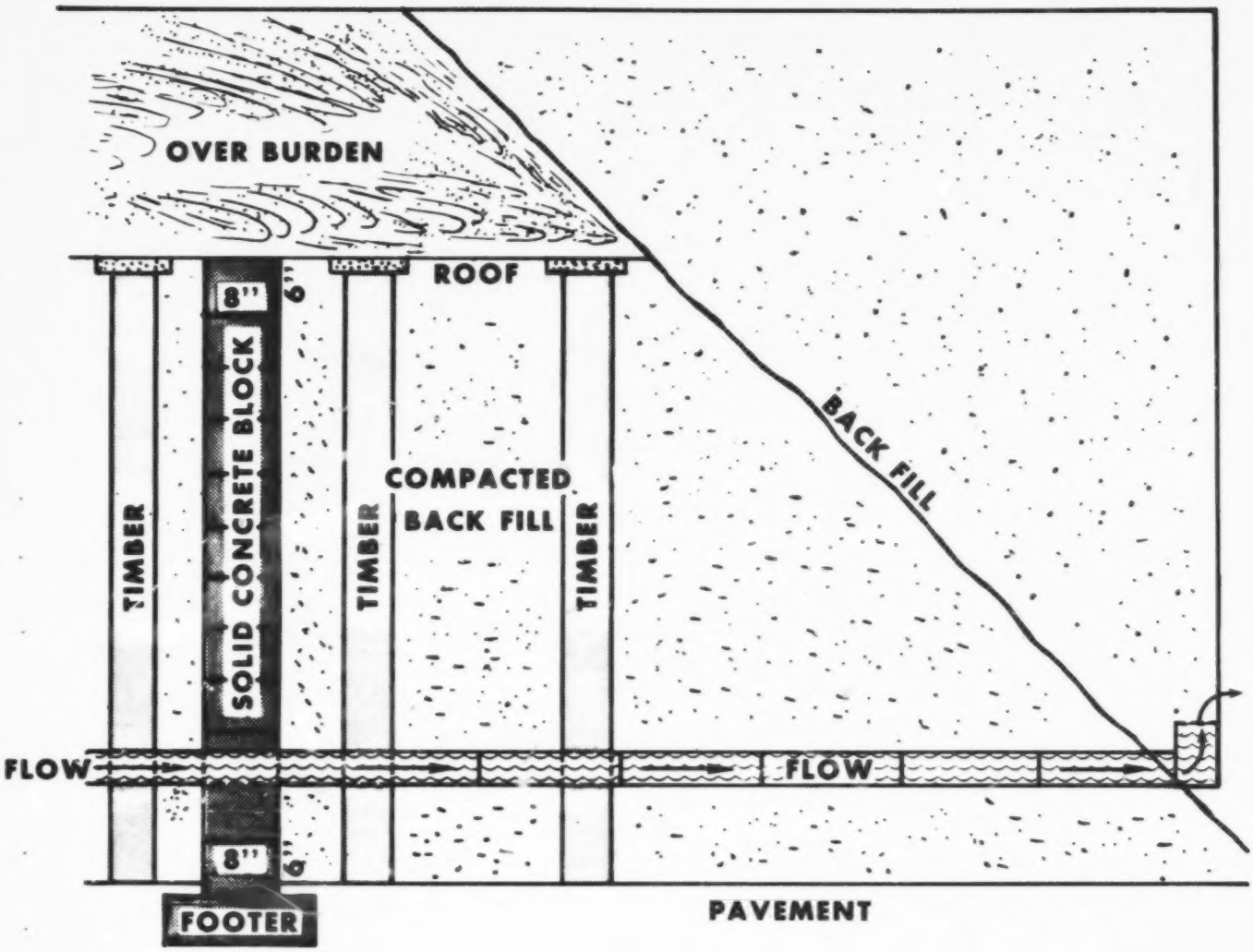
Discussion of Results

All the data collected are presented in the appendix. Tables I-III show the means of chemical analyses, flow rates, and lbs/day of acid, iron and sulfate for seal sites in Areas 1-3.

Area 1

Big Knob mine represents the largest mine drainage on Taylor Run subwatershed. Table I shows that the water discharging from this mine had a lower acidity but a higher iron and sulfate concentration. A reduction in acid loads of 60 percent, sulfates 45 percent, and zero iron occurred

*Formerly Federal Water Pollution Control Administration and Federal Water Quality Administration, Department of the Interior.



TYPICAL WET SEAL

DRIFT MINE OPENING

FIGURE 5

Table I
Record of Sampling Sites on Shavers Fork
Above Bowden Federal Fish Hatchery, Bowden, W. Va.

Area 1

	BIG KNOB MINE (BK-1)		SAVAGE		SUMMERSET CAMBRIA		TAYLOR RUN (TR)	
	Before Sealing 08/66 to 10/67	After Sealing 12/67 to 01/71	Before Sealing 07/66 to 11/67	After Sealing 12/67 to 01/71	Before Sealing 07/66 to 09/66	After Sealing 10/66 to 01/71	Before Sealing 08/66 to 11/67	After Sealing 12/67 to 01/71
Flow (cfs)	.0440	.0177	.1400	.0306	-*	.0350	.4340**	9.1000
Hot Acidity (Mg/l)								
Maximum	282.3	375.0	79.4	23.0	86.0	7.0	27.8	36.0
Minimum	0	0	7.0	2.0	0	0	0	0
Mean	114.3	93.8	23.8	11.6	6.1	.74	6.24	8.0
Lbs/day	24.6	10.1	18.0	1.9	-*	.14	14.6 **	392.4
Total Iron (Mg/l)								
Maximum	85.0	110.0	0.1	2.4	4.5	11.0	10.0	8.0
Minimum	0	0	0	0.1	0.06	1.8	0	0
Mean	4.2	8.5	0.5	1.5	2.0	6.0	1.7	0.72
Lbs/day	0.90	0.91	0.4	0.3	-*	1.1	4.0 **	35.3
Sulfate (Mg/l)								
Maximum	440	1200	82	92	56	130	30	65
Minimum	0	0	7	19	28	16	1	3
Mean	155.8	168.5	46.4	43.8	39.0	51.4	16.0	12.1
Lbs/day	33.6	18.2	35.0	7.2	-*	9.7	37.4**	594.0

*Not measured
**Questionable data

Table II

Record of Sampling Sites on Shavers Fork
Above Bowden Federal Fish Hatchery, Bowden, W. Va.

Area 2

	RED RUN (RR-1)		RED RUN (RR-3)		LINAN #1 (Active)
	Before Sealing 5/67 to 8/67	After Sealing 9/67 to 1/71	Before Sealing 8/25/67	After Sealing 9/67 to 1/71	No Air Sealing 7/67 to 1/71
Flow (cfs)	.0077*	.0192	.0022*	.0187	.0103
Hot Acidity (Mg/l)					
Maximum	70.0	87.4	30.6	57.0	26.0
Minimum	1.1	2.0	30.6	4.0	0
Mean	32.8	43.6	30.6	28.3	16.7
Lbs/day	1.4*	4.5	0.4*	2.9	0.92
Total Iron (Mg/l)					
Maximum	3.5	4.3	0.35	36.0	4.0
Minimum	0.5	0.43	0.35	0.08	0.1
Mean	2.4	2.2	0.35	3.5	0.8
Lbs/day	0.1*	0.23	0.1*	0.3	0.044
Sulfate (Mg/l)					
Maximum	175	260	60	200	140
Minimum	130	27	60	22	3.9
Mean	102.0	117.0	60	50.5	85.6
Lbs/day	4.2	11.3	0.7	5.1	4.8

*Questionable data

Table III

Record of Sampling Sites on Shavers Fork
Above Bowden Federal Fish Hatchery, Bowden, W. Va.

Area 3

	Before Sealing	After Sealing 8/68 to 1/71
Flow (cfs)	No records	1.1800
Hot Acidity (Mg/l)		
Maximum	"	13.0
Minimum	"	0
Mean	"	2.?
Lbs/day	"	17.1
Total Iron (Mg/l)		
Maximum	No records	1.0
Minimum	"	0
Mean	"	0.38
Lbs/day	"	2.4
Sulfate (Mg/l)		
Maximum	No records	50
Minimum	"	3.6
Mean	"	27.2
Lbs/day		173.0

after sealing the mine, however, almost all of these reductions were due to a 60 percent reduction in flow.

Discharge from Summerset Cambria mine prior to sealing was not measured. therefore only concentrations for the three parameters can be compared. Little or no change in acid, iron, and sulfate ion concentrations is shown for the entire period of record. After sealing, records show only minimum loads (lbs/day) discharging from this seal.

Savage Mine. Because extensive data were collected and recorded at the Savage Mine prior to sealing, it is the best site for evaluating effects of the mine seal. Reductions of 89 percent in acidity, 55 percent in sulfate, and 25 percent in iron loads occurred after the mine was sealed. Backfilling of strip mines in the vicinity of the deep mine reduced the flow from the deep mine which accounts for as much as 78 percent of the decreased load. The remainder was due to decreased concentration.

All three of the mines in Taylor Run (Area 1) drain to Taylor Run, thus it was monitored to determine the overall effect of the sealing program. Table I shows a sizable increase in loads (lbs/day) for all three parameters after the mine sealing effort in the upper reaches of the watershed. In comparing the mean ion concentration for the period of record, only minor changes have occurred. It is felt that the flow records for the presealing period are in error and thus the presealing data are worthless. All discharges made after sealing were either measured volumetrically or rated by flow meters by the cooperating agencies' technicians and their accuracy is known.

Area 2

Table II shows that both Red Run seals increased in mean loads after sealing. Again, flow rates prior to sealing are questionable.

However, only slight increases in acid and iron loads are shown. The Linan Mine is an active mine and the chemistry of the mine water discharging from the portal is shown merely to compare the water quality with mine seal discharges. Acid and iron loads are minimal since rock dusting of the mine has neutralized the acid and reduced the iron content in the water. However, sulfate loads of about five lbs/day indicate that an acid condition would exist if the mine were abandoned and not dusted with lime as required by law.

Area 3

The Fishing Hawk #2 mine seal is representative of seals in that area. No preliminary record is available for comparing results of the sealing effort, however the concentration data show the discharges to be of poor quality and still a pollution source. See Table III for chemistry analyses.

Since all the seals have been backfilled with a protective cover of earthen material, it is not known to what extent the blocks have deteriorated, however physical observation of the earthen material in the vicinity of the seal and along the outcrop indicates no leakage from these areas.

In summary, approximately four years of intermittent data have been collected and evaluated by our agency. Review of individual records for these seals indicates that the ion concentration and loads discharging into the stream have not changed to a great extent in the past two years. With the exception of Savage Mine and Big Knob Mine, the sealing program has not significantly reduced the pollution load.

APPENDIX I

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 1

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe.	Cond.	Alkalinity as $CaCO_3$	Al
8/22/66			3.0	200.9	213.2	45	85	130	280	11.2	900		
8/23/66			3.0	175.9	192.4						1250		
8/27/66			3.2	114.0	109.0				160	11.0	700		
9/01/66			2.8	175.0							1100		
9/07/66			2.8	182.0	196.0				450	11.0	680		
9/17/66			2.8	111.2	149.8						700		
9/22/66			2.6	120.0	113.0						650		
9/28/66			3.3			12	74	86	150	3.2	260		
10/6/66		4	3.6	68.0	73.0						500		
10/22/66		3	3.2	111.5	118.0						400		
11/01/66		5	3.2	112.6	61.3						650		
11/18/66	45	3	3.2	152.0	154.0						600		
12/01/66	42	5	2.7	133.9	163.4						650		
12/12/66	44	5	3.2	111.2	111.1						620		
12/20/66	42	5	3.4	113.5	113.5	20	70	90	200	1.3	600		
1/03/67	42	3	3.3	131.7	168.0						950		
1/13/67	42	5	3.5	131.6	148.5						800		
1/26/67	46	6	3.3	97.6	90.8	8			150	5.6	600		
2/09/67	43	7	3.4	90.8	90.8						500		
2/23/67		3	3.5	77.2	45.4	20	70	90	150	7.0	600		
3/09/67	46	8	3.3	63.6	65.8						450		
3/23/67	44	5	3.0	65.8	63.6	20	22	42	120	1.1	350		
4/07/67	46	8	3.2	77.2	81.7						400		
4/21/67	46	6	3.4	95.3	43.1	20	40	60	200	1.7	500		
5/05/67	44	5	3.2	34.0	68.1						400		
5/19/67	48	7	3.5	63.6	70.4	10	40	50	90	2.3	350		
6/02/67	48	1.5	3.2	72.6	79.4						400		
6/16/67	50	3	3.0	232.7	158.9				250	.5+	600		
6/30/67	-	-	3.4	222.7	222.7						580		
7/17/67	48	-	3.3	90.8	136.2	20	5	25	130	7.0	490		
7/31/67			3.5	-	-						500		
8/11/67		5	3.4	302.6	53.3	65	115	180	260	2.5	700		
8/25/67	50	3	3.4	198.6	189.0						700		
9/11/67	50	3	3.2	145.8	157.5	50	150	200	275	.9	700		
10/06/67			3.2	118.0	102.0					6.9	500		3.9
12/08/67			3.2								360		3.1

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 1

Date	Temp °F	Flow GPM	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg.	Hardness Total	SO_4	Fe	Cond. Mmhos/cm	Alk as $CaCO_3$	Al
1/22/68			3.2		143.0					25.0	640		2.3
2/14/68			3.3		101.0					9.1	420		6.0
3/15/68	49	3.0	3.2	103.3	94.2	20	15	35	190	6.0	525		
4/07/68	47	4.0	3.3	98.7	95.3	15	15	30	120	4.6	410		
5/10/68	48	1.0	3.6	236.1	230.4	45	55	100	325	5.7	660		
6/13/68	48	1.0	3.3	100.0	90.0	30	20	50	260	4.5	550		
7/08/68	50	1.0	3.3	183.0	200.0	45	05	50	375	6.0	825		
7/30/68	12°C	1.8	3.2	211.0	194.0	86	100	186	420	49.0	900		12.0
8/19/68	10°C	2.0	3.2	170.0	163.0	50	40	90	220	19.0	600		7.4
9/23/68	-	-	3.1	218.0	202.0	78	140	218	380	44.0	700		11.0
10/11/68	53	0.5	3.2	200.0	220.0	-	-	-	700	6.5	950		
11/26/68	9°C	.20	3.6	82.0	76.0	12	26	38	120	4.4	300		9.4
1/27/69	8°C	.15	3.0	78.0	74.0	24	22	46	114	4.3	300		3.2
4/29/69	9°C	cfs .05	3.1	80.0	66.0	25	46	71	87	10.0	340		3.0
5/26/69	10°C	" .03	3.1	140.0	129.0	34	58	92	150	10.0	420		4.3
6/12/69	49	5.0	3.4	158.0	140.	30	120	150	350	4.3	650		
7/10/69	48	5.0	3.0	200.0	185.0	45	145	190	700	3.3	500		
8/14/69	48	7.5	3.1	121.0	120.0	150	100	250	280	9.3	625		
9/04/69	48	6.8	3.0	125.0	123.0	30	80	110	350	13.0	640		
12/03/69	10	cfs .004	3.1	110.0	83.0	26	50	76	130	8.5	470		3.7
5/31/70		" .005	3.2	118.0	100.0	38	78	116	164	14.	550		
8/31/70	10	" .002	3.3	159.0	130.0	45	99	144	170	20.	480		10.
11/24/70		" .002	3.1	-	66.0	22	58	80	70	6.	350		10.
12/14/70			3.3	90.0	64.0	10	31	41	44	1.4	350		4.0
1/18/71	8°C	" .002	3.4	-	52.0	18	38	56	52	3.4	240		3.1

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 2

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond.	Alkalinity as $CaCO_3$	Al
1/22/68			3.2		84.0					4.00	470		6.8
2/14/68			3.4		69.0					2.50	330		3.9
3/15/68	43	5.0	3.4	63.6	61.3	10	15	25	105	2.8	390		-
4/07/68	47	4.0	3.4	64.7	56.8	15	15	30	60	2.0	270		
5/10/68	48	1.0	3.5	174.8	163.4	20	50	70	175	4.5	450		
6/13/68	48	1.0	3.3	65.0	63.0	20	40	40	130	1.0	350		
7/08/68	50	1.0	3.3	183.0	112.0	30	20	50	200	5.0	525		
7/30/68	12°C	0.9	3.3	132.0	120.0	35	40	75	180	4.6	650		11.0
8/19/68	10°C	2.0	3.3	85.0	77.0	20	19	39	110	2.7	460		4.9
9/23/68	-	-	3.1	158.0	130.0	32	70	102	200	12.0	540		11.0
10/11/68	54	0.25	3.1	146.0	155.0	-	-	-	400	6.0	750		
11/26/68	9°C	.20	3.3	62.0	58.0	10	30	40	94	2.3	280		8.0
1/27/69	8°C	.10	3.2	59.0	53.0	19	22	41	70	2.3	230		1.6
4/29/69	9°C	cfs.05	3.2	62.0	44.0	12	26	38	53	3.0	260		3.0
5/26/69	10°C	" .03	3.4	88.	77.	16	30	46	77	2.5	340		5.0
6/12/69	50	3.8	3.4	100.	92.	20	50	70	180	2.4	500		
7/10/69	48	3.8	3.0	121.	114.	20	110	130	300	3.8	475		
8/14/69	48	7.5	3.0	57.	54.	15	40	55	120	2.4	315		
9/04/69	48	6.8	3.0	96.	91.	15	40	55	275	3.0	500		
12/03/69	10°C	cf.006	3.1	85.	68.	16	32	48	92	4.0	370		3.3
5/31/70	cfs	.001	3.4	83.	75.	18	41	59	109	3.	400		
8/31/70	10°C	" .001	3.5	132.	116.	25	58	83	100	6.1	420		8.2
11/24/70		" .002	3.2		50.	20	45	65	55	5.	330		10.
1/18/71	8°C	" .002	3.6	56.	41.	10	25	35	36	2.0	190		2.5

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 3

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe.	Cond.	Alkalinity as $CaCO_3$	Al
8/23/66			3.6	60.2	61.3						500		
8/27/66			3.2	114.0	109.0				160	11	700		
9/07/66			3.0	157.0	135.0				200	6	600		
9/15/66			3.1	63.5	77.0						400		
9/22/66			3.0	52.0	43.0						255		
9/23/66			2.8	54.0	57.0						480		
9/28/66			3.7	36.0	29.5	6	14	20	30	1.6	180		
10/06/66													
10/22/66		.5	3.6	79.4	86.3						400		
11/01/66		.5	3.3	127.1	124.8						650		
11/18/66	45	.5	3.5								600		
12/01/66	42	2	3.2	113.5	113.5						500		
12/12/66	36	1	3.4	124.8	118.0						700		
12/20/66	39	.5	3.6	136.2	147.5	26	4	30	300	1.4	560		
1/03/67	38	.5	3.4	187.3	203.0						800		
1/13/67	46	.5	3.5	186.1	179.0						750		
1/26/67	42	2	3.2	152.1	170.2	16			250	5.8	750		
2/09/67	43	2	3.6	120.0	133.9						500		
2/23/67		.3	3.8	79.4	79.4	30	50	80	130	6.0	400		
3/09/67	48	5	3.4	65.8	77.2						400		
3/23/67	34	3	3.2	77.2	88.5	12	30	42	150	1.8	390		
4/07/67	48	3	3.3	68.1	86.3						325		
4/21/67	44	3	3.4	95.3	102.1	30	30	60	250	2.0	400		
5/05/67	42	1	3.4	127.1	136.2						550		
5/19/67	48	2	3.4	86.3	99.9	20	30	50	150	1.6	400		
6/02/67	50	1	3.3	81.7	93.1						410		
6/16/67	50	1	3.0	255	255				440	5.0	700		
6/30/67	-	-	3.4	155.0	177.0						600		
7/17/67		No Flow											
7/31/67	48		3.6								600		
8/11/67	-	2	3.4	393.6	59.0	65	175	240	220	2.9	1000		
8/25/67	58	.3	3.5	252.6	225.3						750		
9/11/67	50	.5	3.1	297.9	282.3	10	190	200	360	1.25	1000		
10/26/67			2.8	250.0	251.0					2.70	800	23.0	
11/06/67			3.3	85.0	81.0					2.80	350	3.3	
12/08/67			3.0		234.0					49.0	670	14.0	

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 2

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe.	Cond.	Alkalinity as $CaCO_3$	Al
8/22/66			3.6	45.4	49.9	35	35	70	75	.5	300		
8/23/66			3.2	85.1	88.5						600		
8/22/66			3.2	114.0	109.0				160	11	700		
9/01/66			2.8	175.0							1100		
9/07/66			2.9	142.0	143.0				240	4	550		
9/17/66			2.8	66.9	70.0						490		
9/22/66			2.6	91.0	100.0						600		
9/23/66			2.8	61.0	64.0						400		
9/28/66			4.4	13.6	20.0	14	42	56	150	2.6	160	4	
10/01/66		1	3.5	73.0	98.0						50		
10/22/66		5	3.5	88.4	90.8						500		
11/01/66		5	3.1	93.1	97.6						550		
11/18/66	45	1	3.2	99.9	83.9						600		
12/01/66	42	5	2.8	70.4	97.6						510		
12/12/66	44	5	3.5	26.1	49.9						350		
12/20/66	42	3	3.3	65.8	71.4	14	36	50	85	85	450		
1/03/67	44	3	3.4	90.8	111.2						600		
1/13/67	44	5	3.4	88.5	88.5						600		
1/26/67	46	10	3.3	79.4	88.5	10			130	5.0	500		
2/09/67	43	7	3.6	49.9	61.2						350		
2/23/67		5	3.5	131.7	68.1	10	90	100	125	3.2	450		
3/09/67	46	15	3.4	43.1	52.2						350		
3/23/67	44	7	3.2	45.4	39.8	6	18	24	60	.4	150		
4/07/67	46	15	3.4	49.9	34.6						300		
4/21/67	46	5	3.4	56.7	63.6	10	30	40	110	1.8	350		
5/05/67	46	7	3.2	61.3	61.3						350		
5/19/67	46	8	3.6	45.4	56.7	10	20	30	75	1.3	250		
6/02/67	48	5	3.4	49.9	56.7						300		
6/16/67	50	3	3.1	102.2	102.0				95	2.3	400		
6/30/67	-	-	3.4	65.0	65.0						400		
7/17/67	48	-	3.4	81.7	81.7	20	0	20	100	1.6	275		
7/31/67	-	-	3.5	-	-						325		
8/11/67	-	4	3.5	246.3	30.6	25	75	100	140	1.7	600		
8/25/67	50	5	3.4	118.6	116.3						550		
9/11/67	50	4	3.2	100.4	112.1	20	190	210	140	3.5	550		
10/11/67			3.1	91.0	80.0					5.6	360		6.3
11/06/67			3.1	166.0	152.0					12.0	560		12.0
12/08/67			3.3		62.0					2.20	250		1.9

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 3

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg.	Hardness Total	SO_4	Fe	Alkal. Cond. as $CaCO_3$	Al
1/22/68			3.0		160.0					8.6	580	6.8
3/15/68	46	1.0	3.1	213.4	198.6	20	5	25	400	9.0	790	
4/07/68		Dry										
5/10/68		Dry										
6/13/68		Dry										
7/08/68		Dry										
7/30/68		Dry										
8/19/68	10°C	cfs 1.0	3.1	375.0	341.0	96	100	196	490	110.0	1200	10.0
9/23/68	-	-	3.0	395.0	361.0	90	166	256	510	14.0	1120	.5
10/11/68	54°	0.25	3.2	343.0	375.0	-	-	-	760	6.5	1100	-
11/26/68	8°C	cfs .05	3.2	226.0	218.0	60	94	154	380	62.0	560	21.0
1/27/69	7°C	" .05	2.8	242.0	246.0	41	77	118	77	40.0	600	17.0
4/29/69	9°C	" .02	3.0	222.0	198.0	62	115	177	300	76.0	680	13.0
5/26/69	10°C	" .01	4.4	17.0	13.0	18	20	38	29	.4	120	1.0
6/12/69	46	0	3.3	400.0	362.0	200	200	400	1200	29.0	1200	
7/10/69	52	0	2.7	320.0	240.0	0	250	250	690	41.0	650	
8/14/69	52	0	3.0	150.0	150.0	300	100	400	670	17.8	1000	
9/04/69	52	0	2.9	460.0	280.0	35	215	180	420	22.1	1200	
12/03/69	10°C	cfs .002	3.0	160.0	151.0	56	89	145	280	60.0	670	9.0
5/31/70		" .001	3.1	195.0	185.0	65	106	171	287	60.	840	
8/31/70		No Flow										
11/24/70		cfs .001	4.4		13.	35	44	79	49	3.	170	7.0
1/18/71	7°C	.002	4.0	24.0	14.	15	20	35	16	.7	110	1.8

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 3 A

Date	Temp. °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg.	Hardness Total	SO_4	Fe.	Cond.	Alkalinity as $CaCO_3$	Al
7/31/67	49	-	3.4								500		
8/11/67		15	3.4	34.0	35.1	55	195	250	225	2.3	650		
8/25/67	52	7	3.4	259.6	225.3						750		
9/11/67	50	10	3.0	168.5	168.8	30			225	3.7	700		
11/06/67			3.1	308.0	277.0					81.0	800		2.4

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 4

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg.	Hardness Total	SO_4	Fe	Cond.	Alkalinity as $CaCO_3$	Al
8/23/66			3.0	149.8	170.3						900		
8/27/66			3.0	92.0	93.0				130	3.5	550		
9/01/66			3.3								700		
9/07/66			3.8	17.0	16.0				45	.1	140		
9/13/66													
9/17/66			2.9	113.5	158.0						800		
9/22/66			2.5	144.0	150.0						800		
9/23/66			2.4	159.0	161.0						800		
9/28/66			3.1	132.0	135.0	4	42	46	150	4.0	700		
10/06/66		1.9	3.3	141.0	73.0						800		
10/22/66		1	3.4	112.6	145.0						900		
11/01/66		1	3.4	120.3	127.1						750		
11/18/66	48	5	3.0	131.7	163.7						900		
12/01/66	42	5	3.0	170.2	211.1						900		
12/12/66	46	10	3.5	113.5	119.7						500		
12/20/66	45	5	3.4	122.6	149.8	14	34	48	250	1.8	700		
1/03/67	44	10	3.2	152.1	174.8						800		
1/13/67	46	10	3.4	141.5	163.4						800		
1/26/67	48	30	3.1	124.8	129.4	12			165	1.6	800		
2/09/67	44	10	3.4	122.6	127.1						600		
2/23/67		15	3.4	129.4	140.7	100	100	200	225	5.2	700		
3/09/67	47	60	3.0	158.3	198.8						900		
3/23/67	46	80	3.0	118.0	140.9	10	40	50	190	1.1	600		
4/07/67	48	45	3.1	113.5	122.6						600		
4/21/67	42	30	3.2	131.7	136.2	20	40	60	175	1.1	600		
5/05/67	46	12	3.2	131.7	149.8						600		
5/19/67	46	25	3.2	118.5	118.0	10	80	90	175	2.0	500		
6/02/67	48	7.5	3.0	111.2	122.6						600		
6/16/67	50	15	2.9	147.4	147.5				175	4.2	500		
6/30/67	-	-	3.6	118.0	119.0						600		
7/17/67	48	-	3.2	156.6	181.6	10	10	20	175	4.0	600		
7/31/67	48	-	4.1	-	-						155		
8/11/67	-	8	4.0	120.6	8.0	25	25	50	50	.37	200		

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 4

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
1/22/68			3.8		31.0					.25	175		0.4
2/14/68			3.2		136.0					8.6	580		1.6
3/15/63	49	3.0	3.2	103.3	94.2	20	15	35	190	6.0	525		
4/07/68	48	10.0	3.2	138.5	132.8	20	10	30	125	5.6	550		
5/10/68	48	5.0	3.4	274.7	264.5	30	40	70	300	5.0	730		
6/13/68	48	5.0	3.1	144.0	126.0	20	20	40	310	5.4	600		
7/08/68	49	5.0	3.3	134.0	144.0	30	20	50	240	5.0	670		
7/30/68	12°C	3.2	2.9	214.0	200.0	40	30	70	260	17.0	820		17.0
8/19/68	10°C	5.0	3.1	160.0	152.0	29	29	58	200	8.0	700		9.2
9/23/68	-	-	3.0	175.0	160.0	28	52	80	210	14.0	680		12.0
10/11/68	51	3.0	3.1	200.0	200.0	-	-	-	450	5.8	900		
11/26/68	9°C	.20	3.1	109.0	110.0	16	36	52	160	6.2	440		13.0
1/27/69	8°C	.30	3.0	100.0	95.0	21	31	52	130	4.7	350		4.6
4/29/69	9°C	cfs .10	3.1	92.0	85.0	18	36	54	96	6.0	450		5.0
5/26/69	10°C	" .05	3.1	145.	140.	22	41	63	150	6.0	450		7.0
6/12/69	47	10.7	3.4	119.	111.	20	40	60	240	2.9	575		
7/10/69	47	7.5	3.0	136.	133.	20	70	90	325	3.2	500		
8/14/69	48	10.7	3.0	142.	135.	15	40	55	190	2.1	680		
9/04/69	47	12.5	3.3	124.	119.	20	40	60	290	7.1	600		
12/03/69	10°C	cfs.01	3.1	118.	112.	22	41	63	150	8.2	550		8.5
5/31/70		cfs .005	3.2	117.	110.	22	45	67	259	4.	520		
8/31/70	10°C	cfs .004	3.2	176	130	30	58	88	130	8.0	490		11.6
11/24/70		" .005	3.1	-	95	22	56	78	109	10.	450		14.
1/18/71	9°C	" .005	3.4	73	54	15	32	47	52	2.9	250		5.5

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 5

Date	Temp.	GPM. Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe.	Cond.	Alkalinity as $CaCO_3$	Al
8/23/66			3.8	37.5	38.6						300		
8/27/66			3.8	35.0	32.0				60	3.5	250		
9/01/66			3.3								700		
9/07/66			3.9	17.0	17.0				64	.12	200		
9/17/66			3.3	32.9	33.0						275		
9/22/66			3.0	31.8	34.1						250		
9/23/66			3.0	34.0	32.0						225		
9/28/66			3.4	34.0	20.0	10	30	40	7.5	.4	180		
10/6/66		5	3.7	32.0	27.0						180		
10/22/66		5	3.8	27.2	29.5						210		
11/01/66		3	3.7	31.8	29.5						210		
11/18/66	48	15	3.6	31.8	29.5						250		
12/01/66	42	7	3.4	27.2	38.6						190		
12/12/66	46	15	3.4	20.4	34.3						200		
12/20/66	46	15	3.7	27.2	31.8	10	30	40	49	.4	210		
1/03/67	46	15	3.8	27.2	38.4						210		
1/13/67	46	20	3.8	31.8	29.5						225		
1/26/67	48	40	3.8	34.0	38.6	120	0		165	.4	190		
2/09/67	46	40	3.8	20.4	27.2						180		
2/23/67		35	3.7	22.7	22.7	10	50	60	55	.6	200		
3/09/67	46	150	3.7	35.5	27.0						200		
3/23/67	46	1 cfs	3.8	27.2	22.7	4	22	26	38	.25	150		
4/07/67	46	150	3.7	22.7	22.7						140		
4/21/67	48	1 cfs	3.6	27.2	27.2	40	10	50	50	.4	170		
5/05/67	46	20	3.8	22.7	24.9						140		
5/19/67	46	35	3.8	18.2	20.4	50	20	70	70	1.8	130	2	
6/02/67	46	30	3.6	29.5	31.8						150		
6/16/67	50	2.5	3.6	32.7	34.0				37	.53	160		
6/30/67	-	-	4.0	28.3	39.7						180		
7/17/67	46	-	3.8	45.4	34	10	5	15	55	.45	160		
7/31/67	47	3 gal. (6 sec)	4.2	-	-								
	-												

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 5

Date	Temp °F	GPM Blow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
8/11/67		25.0	4.0	178.6	19.4	20	40	60	54	.55	180		
8/25/67	52	20.0	4.0	46.2	46.0						200		
9/11/67	50	20.0	3.6	32.3	37.2	20	50	70	50	.51	190	30	
11/6/67			3.8	36.0	26.0					0.5	150		
12/08/67			3.7		33.0					0.4	165		1.2
1/22/68			3.8		27.0					8.1	180		0.9
2/14/68			3.9		21.0					0.3	171		1.1
3/15/68	46	4.0	4.0	18.2	15.9	15	10	25	57	6.4	130		
4/07/68	46	6.0	3.8	35.2	34.1	15	25	40	40	0.38	160		
5/10/68	48	4. 0	4.2	51.1	40.9	20	30	50	50	0.5	125		
6/13/68	48	4.0	3.6	41.0	23.0	20	30	50	60	0.5	165		
7/08/68	48	4.0	4.0	29.0	19.0	15	05	20	54	0.43	195		
7/30/68	12°C	2.6	3.8	18.0	14.0	20	18	38	49	.29	250		
8/19/68	10°C	5.0	3.8	30.0	17.0	18	12	30	47	0.3	220		0.8
9/23/68	-	-	3.8	45.0	20.0	18	24	42	52	.4	170		0.8
10/11/68	51°	2.0	4.0	22.0	18.0	20	20	40	65	0.35	215		
11/26/68	9°C	..15	3.8	20.0	23.0	16	24	40	52	.2	200		3.9
1/27/69	8°C	.20	3.7	25.0	23.0	24	21	45	47	.3	120		2.6
4/29/69	9°C	cfs .08	3.9	21.0	15.0	18	24	42	27	.5	165		1.0
5/26/69	10°C	" .06	3.9	37.0	19.0	18	22	40	39	1.0	160		1.0
6/12/69	47	12.5	4.1	23.0	16.0	15	20	35	55	0.39	160		
7/10/69	47	7.5	3.8	24.0	16.0	15	15	30	55	0.42	145		
8/14/69	48	9.4	3.8	21.0	16.0	20	15	35	45	0.35	150		
9/04/69	48	15.0	3.9	21.0	14.0	15	15	30	45	0.42	128		
12/03/69	10°C	cfs .006	3.8	19.0	25.0	18	20	38	36	0.6	200		1.4
5/31/70	-	" .02	3.9	38.	35.	16	25	41	41	1.	190		
8/31/70	10°C	" .006	4.1	53.	0	23	29	52	27	1.	130		3.0
11/24/70	-	" .02	3.8	-	4.	22	34	56	25	1.	150		8.
1/18/71	9°C	" .02	4.0	22.	12.	20	27	47	19	.4	120		1.9

STATE OF WEST VIRGINIA
MINE SEALING
BIG KNOB OPENING NO. 6

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
12/03/67			3.8		121.0					0.6	128		0.9
2/14/68			3.9		20.0					0.5	151		1.0
3/15/68	48	60.0	3.8	29.5	20.4	15	5	20	46	3.7	160		
4/07/68	42	30.0	4.0	26.1	25.0	15	25	40	31	3.3	130		
5/10/68	48	8.0	4.3	62.4	47.7	20	30	50	52	1.8	170		
6/16/68	48	8.0	3.7	24.0	24.0	15	20	35	48	0.64	130		
7/08/68	48	8.0	4.1	24.0	21.0	15	15	30	53	0.75	180		
7/30/68	12°C	15.8	3.9	23.0	18.0	19	15	34	55	.84	200		1.4
8/19/68	10°C	9.0	3.9	40.0	30.0	19	19	38	57	0.7	210		1.3
9/23/68	-	-	3.8	46.0	25.0	22	30	52	73	1.4	200		2.1
10/11/68	51	4.0	3.9	34.0	31.0	20	30	50	96	1.0	175		
11/26/68	9°C	.20	3.8	20.0	17.0	12	20	32	47	.3	150		3.9
1/27/69	8°C	.75	3.7	26.0	20.0	21	20	41	39	.2	110		1.8
4/29/69	9°C	cfs .12	3.9	18.0	12.0	16	20	36	19	.5	120		1.0
5/26/69	10°C	" .08	3.8	27.0	24.0	16	18	34	34	1.0	130		1.7
6/12/69	47	21.4	4.1	27.0	20.0	12	18	30	57	1.02	110		
7/10/69	47	18.8	3.7	31.0	23.0	15	25	40	60	1.18	200		
8/14/69	48	18.8	3.7	29.0	23.0	15	20	35	52	0.38	160		
9/04/69	47	30.0	3.6	29.0	21.0	15	15	30	53	0.90	180		
12/03/69	10°C	cfs .02	3.8	40.0	25.0	16	20	36	43	1.1	180		1.1
5/31/70	-	" .05	3.9	30.0	15.0	14	24	38	30	1.0	150		-
8/31/70	10°C	" .02	3.9	49.0	16.0	20	33	53	36	1.0	140		3.4
11/24/70	-	" .03	3.8	-	5.0	20	30	50	27	1.0	170		7.0
1/18/71	9°C	" .03	4.2	14.	12.	12	10	22	23	.5	90		1.2

STATE OF WEST VIRGINIA
MINE SEALING
RED JUN NO. 1

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
5/05/67			3.8	32.7	27.2					.5	92		
7/31/67	51		4.0								275		
7/18/67	48		3.6	3.4	1.1	10	30	40	175	3.5	250		
8/11/67		3	3.7	73.2	70.0	55	75	130	130	3.2	400		
8/25/67	50	4	3.7	-	-	-	-	-	-	-	450		
9/11/67	50	5	3.3	77.6	64.4	60	120	180	140	2.5	400	20	
11/06/67			3.7	60.0	37.0					2.4	250		
2/14/68			3.7		38.0					1.6	200		1.7
3/15/68	48	5	3.7	49.0	37.5	30	5	35	96	2.0	200		
4/07/68	48	5	3.8	42.0	35.2	30	20	50	68	1.7	210		
5/10/68	48	8	4.1	82.9	87.4	35	55	90	150	2.4	425		
6/18/68	48	8	3.4	85.1	74.9	40	30	70	160	1.8	124		
7/08/68	48	5	3.5	55.0	51.0	50	50	100	150	0.43	200		
7/30/68	12°C	2.3	3.5	71.0	54.0	69	39	108	160	2.9	390		4.2
8/19/68	12°C	2.0	3.6	75.	45.	49	22	71	130	2.2	370		2.1
9/23/68	-	-	3.4	110.	67	56	40	96	150	4.3	330		3.4
10/11/68	52	2.0	3.5	40.	45	70	90	160	210	1.52	425		
11/26/68	10°C	.20	3.6	54	29	24	50	74	70	1.2	150		6.9
1/27/69	8°C	.25	3.4	42	34	33	27	60	73	1.8	150		.7
4/29/69	9°C	cfs .12	3.5	78	24	38	35	73	58	3.0	150		2.0
5/26/69	10°C	" .05	3.5	104	71	46	35	81	87	2.5	230		2.5
6/12/69	48	10.7	3.7	62	46	45	35	80	175	2.9	350		
7/10/69	47	12.5	3.5	50	37	35	25	60	125	2.4	290		
8/14/69	48	15.0	3.6	50	35	30	30	60	90	2.0	200		
9/04/69	48	12.5	3.4	59	40	40	25	65	260	1.4	300		
12/03/69	10°C	cfs .02	3.5	59	35	50	32	82	77	3.4	210		2.0
5/31/70	-	" .03	3.6	54	29	46	41	87	82	1.0	460		
8/31/70	10°C	" .004	3.9	68	32	88	62	150	110	3.8	250		4.8
11/24/70	-	" .005	3.5	-	20	35	41	76	46	2.0	200		9.0
1/18/71	9°C	" .005	3.9	39	22	30	30	60	27	1.8	140		2.3

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STATE OF WEST VIRGINIA
MINE SEALING
RED RUN No. 2

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
5/05/67			3.4	47.7	52.2					2.5	190		
6/02/67		8	3.8	29.5	40.9						140		
7/31/67	56		4.4								325		
8/11/67		3	4.2	44.3	38.5	60	60	120	110	2.2	350		
8/25/67	50	4	4.1	48.6	48.2						360		
9/11/67	50	5	3.6	52.7	48.5	70	70	140	140	1.45	350	20	
10/26/67			3.6	40.0	30.0					1.00	215		1.5
12/08/67			3.8		42.0					2.90	200		1.5
2/14/68			3.9		28.0					1.00	195		1.7
3/15/68	45	5	3.8	37.5	31.8	35	5	40	105	1.8	240		
4/07/68	48	5	3.9	36.3	30.6	35	15	50	60	1.5	190		
5/10/68	54	8	4.6	63.6	63.6	55	35	90	135	1.9	360		
6/16/68	49	5	3.6	48.8	37.5	50	30	80	100	1.4	180		
7/08/68	50	5	3.6	50.0	43.0	60	45	105	145	0.49	400		
7/30/68	13°C	2.3	3.6	52.0	35.0	95	21	116	150	1.7	395		3.3
8/19/68	12°C	-	3.6	46.0	36.0	50	21	71	110	1.7	350		2 2
9/23/68	-	-	3.5	60.0	52.0	62	46	108	140	5.3	350		3 2
10/11/68	55	2.0	3.4	71.0	55.0	25	35	60	120	3.3	300		
11/26/68	10°C	.20	3.7	35.0	25.0	28	54	82	70	1.2	170		3.5
1/27/69	8 C	.25	3.4	38.0	33.0	33	27	60	70	1.8	155		1.0
4/29/69	**9°C**	**cfs.12**	**3.6**	**34.0**	**22.0**	**38**	**34**	**72**	**55**	**3.0**	**150**		**2.0**
5/26/69	**10°C**	**" .05**	**3.6**	**41.**	**29.**	**50**	**34**	**84**	**89**	**1.**	**230**		**2.5**
6/12/69	54	10.7	3.9	44.	39.	50	40	90	145	1.5	350		
7/10/69	50	12.5	3.6	40.	30.	40	30	70	125	1.7	300		
8/14/69	51	15.0	3.5	37.	30.	35	30	65	85	1.6	270		
9/04/69	56	12.5	3.6	36.	32.	40	35	75	250	1.3	300		
12/03/69	2°C	cfs.02	3.6	41.	27.	44	32	76	77	2.5	210		2.0
5/31/70	-	" .03	3.7	45.	35.	49	41	90	76	1.0	300		-
8/31/70	10°C	" .004	3.8	85.	33.	85	58	143	100	2.2	260		4.0
11/24/70	-	" .005	3.7	-	26.	32	42	74	40	1.0	190		8.0
1/18/71	**3°C**	**" .005**	**4.0**	**31**	**20.**	**30**	**30**	**60**	**27**	**1.2**	**140**		**2.7**

STATE OF WEST VIRGINIA
MINE SEALING
RED RUN No. 3

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
7/31/67	58		6.6								60		
8/11/67	-	1	4.2	52.2	30.6	30	20	50	60	.35	180		
8/25/67	50	.5	4.2	68.9							160		
9/11/67	50	3	3.8	52.7	38.2	40	60	100		.55	190	30	
10/26/67			4.2	30.0	24.0						100		1.5
11/06/67			3.9	50.0	32.0					1.6	160		3.0
12/03/67			3.7		40.0					2.3	207		1.3
2/14/68			4.0		28.0					0.3	126		1.8
3/15/68	40	10.	4.4	28.4	15.9	10	20	30	28	0.78	85		
4/07/68	42	8.	4.2	26.1	20.4	15	10	25	22	0.34	85		
5/10/68	44	7.	4.0	63.6	54.5	15	20	35	48	0.95	195		
6/18/68	43	8.	3.6	77.2	48.8	20	80	100	110	0.57	95		
7/08/68	47	8.	3.9	53.0	21.0	15	15	30	29	0.08	155		
8/19/68	12°C	2.0	3.8	45.	30.	19	13	32	57	1.0	200		2.6
9/23/68	-	-	3.7	70.	36.	22	22	44	68	1.7	180		2.8
10/11/68	50	1.0	3.3	66.	57.	60	80	140	200	3.25	450		
11/26/68	9°C	.70	3.8	28.	23.	18	44	62	44	.6	130		3.9
1/27/69	8°C	.20	3.7	35.	25.	22	13	35	30	1.6	90		1.8
4/29/69	9°C	cfs .08	4.0	23.	21.	18	11	29	23	1.0	90		2.0
5/26/69	10°C	" .04	3.9	25.	30.	18	13	31	31	.5	130		2.5
6/12/69	48	10.7	4.1	45.	28.	10	20	30	58	1.02	70		
7/10/69	47	12.5	3.9	41.	22.	5	30	35	52	0.91	150		
8/14/69	47	15.0	3.7	39.	23.	10	15	25	42	0.54	110		
9/04/69	48	12.5	3.7	45.	23.	10	10	20	44	0.58	145		
12/03/69	10°C	cfs.01	4.2	25.	21.	19	12	31	29	1.6	110		2.0
5/31/70	-	cfs .005	3.9	46.	30.	15	16	31	27	1.0	160		-
8/31/70	10°C	" .006	4.5	0	4.	32	25	57	27	1.0	120		4.0
11/24/70	-	" .002	4.0	-	13.	18	18	36	40	36.	100		10.0
1/18/71	Too much snow												

STATE OF WEST VIRGINIA
MINE SEALING
TAYLOR RUN AT ROUTE 33 BRIDGE

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond.	Alkalinity as $CaCO_3$	Al
8/04/66			7.6	10.0	0.0								
9/17/66			6.4	2.8	0.00						79		
9/22/66			5.0	2.3	1.35						50		
9/23/66				0.7	0.4						70		
9/26/66			6.8	0	0						58		
9/28/66			5.6	4.5	0.00	8	6	14	1	.1	50	10	
9/29/66			5.9	9.1	2.3						52		
10/06/66		2	6.8	4.5	9.0	0	30	30	15	.02	55	12	
10/22/66		2	5.4	4.5	4.5						58		
11/01/66		2	6.4	3.4	0.0						57		
11/18/66	46	5	5.2	4.4	9.0						60		
12/01/66	48	10	5.6	4.5	13.6						59		
12/12/66	40	15	6.0	4.5	13.6						49		
12/20/66	38	12	5.6	6.8	6.8	10	10	20	5	.15	55	20	
1/03/67	37	15	5.6	3.4	9.1						65		
1/13/67	36	5	5.2	3.4	0.0						53		
1/26/67	44	12	5.3	9.1	6.8	10			11	.05	50	10	
2/09/67	33	5	6.2	4.5	0.0						55		
2/23/67		6	5.5	4.5	6.8	10	10	20	15	0	50	10	
3/04/67	44	18	6.3	2.3	1.1						55		
3/23/67	38	17	5.8	4.4	13.6	6	4	10	12	0	50	8	
4/07/67	50	18	6.4	4.5	4.5						50		
4/21/67	44	5	6.6	9.1	9.1	180	20	200	30	0	57	18	
5/05/67	44	5	6.2	4.5	4.5						45		
5/19/67	50	10	6.4	6.8	11.3	10	6	16	20	10	40	32	
6/02/67	52	4.5	6.9	15.9	13.6						55		
6/16/67	60	4	6.7	25	25				15	.06	75	21	
6/30/67	-	-	5.8	28.3	3.4						50		
7/17/67	56	-	6.6	3.4	2.8	25	5	30	20	.05	50		

STATE OF WEST VIRGINIA
MINE SEALING
TAYLOR RUN AT ROUTE 33 BRIDGE

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
7/31/67	66	6.	6.0		1.1						68		
8/11/67		3.5 (c.f.s.)	5.8	121.6	0	30	5	35	20		90		
8/25/67	60	5 cfs	6.0	7.7	27.8						80		
9/11/67	54	5 "	5.9	7.4	5.4	40	0	40	28		80	50	
11/6/67			6.4							8.0	50		
12/06/67			6.3								47		
1/22/68			6.4								60		
2/14/68			6.5							0.1	48		0.1
3/15/68	38	25 cfs	6.4	2.3	2.3	10	10	20	11	0.13	39		
4/07/68	48	8 "	6.4	3.4	3.4	15	10	25	4		43		
5/10/68	51	5 "	7.3	2.3	0.0	20	10	30	14	0.06	60		
6/13/68	48	5.	4.6	36.0	15.0	15	20	35	65	0.85	90		
7/08/68	64	5 cfs	5.6	3.	0.0	40	15	55	17	0.10	85		
7/30/68	NONE												
8/19/68	14 °C	-	6.9	10.	0.0	21	10	31	6.5	.05	80		
9/23/68	-	-	7.1	7.	0.0	34	28	62	16.0	.6	94		
10/11/68	57	4.0cfs	5.7	4.	0.0	30	10	40	18.0	0.11	90		
11/26/68	8°C	30.	6.3	0.	0.0	11	4	15	13.0	-	47		3.5
1/27/69	1°C	50.	5.7	4	3.	21	6	27	4.2	0	40		.7
4/29/69	4°C		6.3	9.	0	18	6	24	4.8	.5	50		2.0
5/26/69	9°C	.08cfs	6.6	13.	0	18	4	22	7.	1.	60		0
6/12/69	57	4.3 cfs	6.7	1.0	0	18	7	25	11.	0.11	77		
7/10/69	60	5.8 "	5.8	1.0	0	20	5	25	12.	0.13	77		
8/14/69	59	7.8 "	5.4	1.0	0	10	10	20	12.	0.11	60		
9/04/69	60	19.0 "	5.9	2.0	0	7	11	18	7.	1.70	60		
12/03/69	4°C	50.0 "	6.4	0	0	21	4	25	7.2	.4	75		.5
5/31/70	-	12.0 "	6.4	10.	0	22	8	30	10.	.5	80		16.
8/31/70	12°C	3.0 "	6.4	20.	0	32	10	42	3.	0	60	8	2.4
11/24/70	-	4.0 "	5.8	-	0	20	10	30	8.	1.	60		6.0
1/18/71	2°C	5.0 "	5.9	31.	14.	16	8	24	4.4	.5	100	8	.1

STATE OF WEST VIRGINIA
MINE SBALING
SOMERSET CAMBRIA

Date	Temp. °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond.	Alkalinity as $CaCO_3$	Al.
7/27/66			6.3	18.7	17.0				28	1.35	200		
7/28/66			6.3	79.5	0.00				34	4.5	200		
7/29/66			6.5	21.5	5.7								
8/04/66			6.2	23.8	0.0								
8/06/66			6.8	18.2	13.6	40	70	110	39	.06	210	45	
8/27/66			6.4	86.0	0.0				56	.15	210		
9/28/66			5.4	50.0	4.5	42	38	80	40	2.4	180	42	
10/01/66		2	5.6	47.7	0.00						225		
10/18/66	48	3	5.8	74.8	0.0						230		
12/12/66	46	7.5	5.8	63.6	124.8						250		
12/20/66	48	7	6.0	43.1	0.0	40	50	90	47	.21	225	44	
1/03/67	48	7.3	5.8	31.8	9.1						250		
1/13/67	48	5	5.7	68.0	0.0						225		
1/26/67	50	7	5.8	34.0	0.00	56			54	5.8	150	46	
2/09/67	48	8	5.7	56.7	0.0						240		
2/23/67	48	7	6.3	45.4	0.0	50	20	70	80	5.4	225	50	
3/09/67	48	20	5.8	31.8	0.0						200		
3/23/67	48	10	6.0	30.8	2.3	38	36	74	50	.85	180	26	
4/07/67	48	7	5.8	52.0	0.0						180		
4/21/67	48	10	5.8	56.7	0.0	100	60	160	70	1.6	180	44	
5/05/67	48	6	6.0	54.5	0.0						140		
5/19/67	48	7	6.0	34.0	0.0	50	20	70	70	2.5	180	34	
6/02/67	52	7	5.8	52.2	0.0						170		
6/16/67	52	5	6.0	38.0	2.0	-	-	-	46	4.0	190	44	
6/30/67	-	-	6.5	54.1	12.1	-	-	-	-	-	200	-	
7/17/67	49	-	6.7	49.9	5.9	50	30	80	50	4.5	190	-	
7/31/67	49	Area 12" Vec. 697	6.4	-	-	-	-	-	-	-	138	-	
8/11/67	-	3.5	6.4	2.27	0	65	25	90	40	4	180	-	
8/25/67	52	5	6.2	73.5	36.9	-	-	-	-	-	200	-	
9/11/67	48	5	5.8	77.7	7.7	70	10	80	50	2.7	200	40	
10/06/67	-		6.3	48.0	0.0	-	-	-	-	8.4	175	-	
12/08/67	-		6.2							4.7	160	-	

STATE OF WEST VIRGINIA
MINE SEALING
SOMERSET CAMBRIA

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al.
1/22/68			6.2							7.1	175		
2/14/68			6.2							2.8	160		
3/15/68	50	40.0	6.1	54.5	0.0	50	30	80	61	6.0	190		
4/07/68	50	10.0	6.0	44.3	0.0	15	40	55	43	1.8	170		
5/10/68	50	2.0	6.7	62.4	0.0	60	20	80	52	6.0	235		
6/13/68	50	4.0	5.7	40.0	0.0	50	20	70	95	4.5	160		
7/08/68	50	5.0	5.4	42.0	0.0	45	45	90	42	5.5	140		
7/30/68	12°C	4.0	6.1	15.0	7.0	32	19	51	42	4.4	160		
8/19/68	10°C	4.0	6.1	30.0	0.0	41	22	63	34	4.9	175		
9/23/68	-	-	6.2	36.0	0.0	42	40	82	36	7.0	150		
10/11/68	54	1.0	5.4	34.0	0.0	50	25	75	50	7.2	160		
11/26/68	9	.2	6.1	30.0	0.0	50	34	84	53	6.4	150		5.2
1/27/69	8	.6	5.6	41.0	0.0	53	34	87	49	6.0	140	35	1.0
4/29/69	9°C	cfs.15	6.4	12.0	4.0	75	43	118	31	11.0	150		1.0
5/26/69	10°C	" .08	6.2	20.0	0	53	30	83	36	7.	150		0
6/12/69	50	9.4	6.2	36.0	0	45	35	80	130	7.1	180		
7/10/69	47	6.3	5.3	46.0	0	40	30	70	130	8.2	100		
8/14/69	48	7.5	5.2	34.0	0	50	25	75	47	5.7	190		
9/04/69	49	12.5	5.5	33.0	0	50	20	70	60	3.0	140		
12/03/69	10	cfs.1	6.0	22.0	0	66	38	104	36	8.0	170		.6
5/31/70	-	cfs .03	6.0	25.0	0	49	32	81	25	3.0	160		36.0
8/31/70	10°C	" .04	6.1	60.0	0	65	41	106	41	10.0	150	40	1.0
11/24/70	-	" .05	6.0	-	0	55	49	106	22	5.0	150		6.0
1/18/71	9°C	" .05	5.8	27.0	6.0	60	41	101	16	4.8	120	30	.3

STATE OF WEST VIRGINIA
MINE SEALING
SAVAGE MINE

Date	Temp. °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg.	Hardness Total	SO_4	Fe.	Cond.	Alkalinity as $CaCO_3$	Al.
7/28/66			4.8	73	32				68	.28	225		
7/29/66			4.8	215	45								
8/04/66			4.4	283	23								
8/09/66			4.4	12.8	15.8	20	60	80	60	0	250	5	
8/12/66			3.8	34.0	49.9	20	50	70	70	.05	200	0	
8/27/66						Dry							
9/18/66		158	4.4	14.7	9.6				7	.34	158		
9/28/66			4.3	20.4	7.0	4	10	14	8	.45	55	2	
10/06/66		No Flow											
11/01/66		No Flow											
11/18/66	48	5	4.0	65.8	79.4						160		
12/01/66	42	10	3.5	45.4	29.5						200		
12/12/66	42	15	4.0	45.4	22.7						180		
12/20/66	48	12	4.6	52.2	12.5	14	0	14	47	.4	145	4	
1/03/67	46	6	4.2	26.1	27.2						160		
1/13/67	48	10	4.5	59.0	20.4						170		
1/26/67	44	12	4.2	68.1	18.2	16			48	.9	140	4	
2/09/67	48	10	4.5	43.1	11.3						150		
2/23/67	48	8	4.3	45.4	20.4	20	20	40	70	.6	140	8	
3/09/67	46	15	4.8	22.7	11.3						100		
3/23/67	44	12	4.0	22.7	13.6	8	16	24	28	.05	80	2	
4/07/67	46	10	4.2	29.5	13.6						85		
4/21/67	48	15	4.4	34.0	15.9	20	20	40	45	.6	100	10	
5/05/67	48	7	4.4	43.1	22.7						140		
5/19/67	46	15	4.6	22.7	9.1	10	10	20	40	.35	70	20	
6/02/67	46	10	4.2	34.0	18.2						90		
6/16/67	48	8	4.1	12.5	7.9	-	-	-	37	.42	110	4.0	
6/30/67	-	-	4.5	30.6	22.70	-	-	-	-	-	110	-	
7/17/67	47	-	4.5	90.8	45+	12	18	30	36	.4	90	-	
7/31/67	47	3 gal 6sec	4.6	- -	-	-	-	-	-	-	90	-	
8/11/67	-	7.0	4.6	59.0	19.3	20	25	45	50	.1	120	-	
8/25/67	50	7.0	4.6	48.5	50.5	-	-	-	-	-	125	-	
9/11/67	48	(cfs) 2.0	4.6	66.4	25.9	30	50	80	82	2.8	180	10	
11/06/67			4.9	59.0	16.0					0.1	120	-	
12/08/67			4.4		12.0					0.7	108	-	

STATE OF WEST VIRGINIA
MINE SEALING
SAVAGE MINE

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al.
1/22/68			4.3		23.0					0.73	138		1.2
2/14/68			4.6		11.0					0.1	106		0.6
3/15/68	48	40.0	4.4	36.3	15.9	20	15	35	53	0.99	115		
4/07/68	47	12.0	4.3	28.4	18.2	15	20	35	25	0.32	92		
5/10/68	47	4.0	4.9	36.3	14.8	20	20	40	45	0.95	100		
6/13/68	48	5.0	4.6	36.0	15.0	15	20	35	65	0.85	90		
7/08/68	48	5.0	4.6	36.0	8.0	20	25	45	34	0.70	115		
7/30/68	-	DRY	-	-	-	-	-	-	-	-	-		
8/19/68	10°C	5.0	4.7	30.0	7.0	24	22	46	44	1.3	130		1.2
9/23/68	-	-	4.7	45.0	0	28	18	46	60	1.1	136		1.5
10/11/68	51	1.0	4.7	40.0	19.0	40	30	70	92	1.6	175		-
11/26/68	9°C	.2	4.4	32.0	8.0	22	32	54	52	1.4	120		4.2
1/27/69	8°C	.5	4.1	41.0	13.0	26	22	48	35	1.1	90		1.8
4/29/69	9°C	cfs.10	4.7	17.0	5.0	12	18	30	19	.5	69		.3
5/26/69	10°C	" .08	4.8	31.0	9.0	16	15	31	25	1.5	80		.6
6/12/69	48	10.7	4.7	34.0	9.0	10	20	30	44	0.48	118		
7/10/69	47	10.0	4.8	43.0	11.0	20	20	40	55	0.91	150		
8/14/69	48	15.0	4.3	42.0	19.0	25	25	50	68	0.75	185		
9/04/69	48	10.0	4.2	38.0	16.0	18	17	35	64	1.61	150		
12/03/69	10	cfs .05	4.2	27.0	20.0	26	22	48	41	2.4	140		1.2
5/31/70	-	cfs .03	4.5	33.0	9.0	15	20	35	25	1.0	110		-
8/31/70	10°C	" .02	5.3	32.0	10.0	23	28	51	25	1.8	110		3.1
11/24/70	-	" .03	4.2	-	2.0	22	34	56	25	2.0	120		8.0
1/18/71	9°C	" .04	4.5	10.0	4.0	18	21	39	24	.6	80		.7

STATE OF WEST VIRGINIA
MINE SEALING
FISHING HAWK NO. 1

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
8/19/68	9°C	-	6.5	16	0	19	5	24	29	0.2	140		
9/23/68	-	-	6.5	15	0	22	12	34	31	1.6	140		
10/11/68	54	2.5cfs	4.3	7	9	0	5	5	14	0.27	35		
11/26/68	9°C	1.0	6.2	9	0	28	12	40	47	.2	120		3.7
1/27/69	8°C	.80	5.8	17	0	34	14	48	27	0	90		.4
4/29/69	9°C	cfs .35	6.3	9	0	38	17	55	25	.5	94		.2
5/26/69	10°C	" .20	6.4	18	0	28	11	39	24	1.	120		.5
6/12/69	55	" 2.2	4.7	8	8	0	3	3	7	0.22	31		
7/10/69	56	"15.4	4.2	11	11	0	3	3	11	0.45	60		
8/14/69	57	" 2.7	4.1	8	8	0	0	0	7	0.15	35		
9/04/69	58	" 5.9	4.1	10	10	0	3	3	6	0.35	30		
12/03/69	10°C	" .20	6.1	9	0	36	13	49	34	1.0	150		5
8/31/70	10°C	"10.0	6.0	23	0	50	16	69	19	0	140	16	9
11/24/70	-	" .08	6.6	-	0	38	24	62	82	1.0	140		5.
1/18/71	Too much snow												

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STATE OF WEST VIRGINIA
MINE SEALING
FISHING HAWK NO. 2

Date	Temp °F	Flow GMP	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond. Mmhos/cm	Alk as $CaCO_3$	Al
8/19/68	9°C	10	7.1	10	0	30	10	40	36.	0.3	170		
9/23/68	-	-	6.7	5	0	40	24	64	48.	2.3	150		
10/11/68	50	8.	5.8	14	0	20	20	40	50.	0.32	175		
11/26/68	5°C	7.	4.5	0	4	3	6	9	7.8	0	40		3.7
1/27/69	2°C	50.	4.3	11	13	16	4	20	3.6	0	27		.6
4/29/69	4°C		4.8	8	5	6	2	8	4.1	.5	35		1.0
5/26/69	9°C		5.8	11	9	3	1	4	5.	1.	34		.5
6/12/69	46	30.	5.5	14	0	20	10	30	48.	0.29	117		
7/10/69	46	25.	6.0	16	0	20	10	30	48.	0.39	185		
8/14/69	46	21.4	5.4	12	0	20	10	30	37.	0.43	155		
9/04/69	46	50.0	5.6	16	0	22	3	25	50.	0.37	183		
12/03/69	4°C	20.0	5.7	12	0	6.8	1.2	8	6.3	.7	45		.6
8/31/70	12.0	1.50	4.5	30	7	3	2.4	5.4	12.	0	45	0	2.9
11/24/70	-	2.0	4.6	-	0	10	3.2	13.2	4.	1.	35		6.0
1/18/71	Too much snow												

STATE OF WEST VIRGINIA
MINE SEALING
FISHING HAWK NO. 3

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
8/19/68	9°C	-	6.9	7	0	36	19	55	47.	0.6	170		
9/23/68	-	-	4.5	9	0	3	4	7	3.4	0.6	250		.4
10/11/68	53	0.5	5.5	25	3	50	15	65	75.	5.3	160		
11/26/68	7°C	.05	6.2	0	0	18	20	38	28.	.1	70		3.6
1/27/69	6°C	.05	5.9	7	1	26	12	38	13.	.1	45	8	-
4/29/69	**8°C**	**cfs.005**	**6.3**	**7**	**0**	**31**	**20**	**51**	**16.**	**.5**	**60**		**.2**
5/26/69	**10°C**	**" .002**	**6.6**	**15**	**0**	**34**	**20**	**54**	**36.**	**7.**	**100**		**.5**
6/12/69	46	2.0	6.4	30	0	30	15	45	80.	8.9	180		
7/02/69	50	2.0	5.9	32	0	0	30	30	140.	8.7	155		
8/04/69	49	2.0	5.5	30	0	30	30	60	43.	2.0	150		
9/04/69	49	2.0	5.6	32	0	35	15	50	48.	1.8	160		
12/03/69	8°C	cfs.01	6.2	7	0	28	14	42	24.	1.2	84		.4
8/31/70	11°C	" .002	6.1	0	4	35	24	59	26.	2.4	100	8.0	2.
1/18/71	**Too much snow**												

EPA - N ton Mine Drainage Field Site
Box 60, ..orton, West Virginia 26285

STATE OF WEST VIRGINIA
MINE SEALING

Exhibit 14
Table I

Linan #1 Mine (Active Deep Mine)

Date	Temp. °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg.	Hardness Total	SO_4	Fe	Cond.	Alkalinity as $CaCO_3$	Al.
				(As $CaCO_3$)									
7/25/67			5.8	103.28	14.75	100	40	140	140	4.0	235		
8/11/67			6.2	3.4	0	35	10	45	25	1.3	100		
9/11/67			7.1	3.4	3.4	20	-	20	12	0.35	72		
9/29/67	54		5.6	5.7	11.35	20	-	20	29	0.35	48		
10/12/67	52		5.6	11.3	6.8	30	-	30	29	0.35	100		
6/13/68			3.2	22.7	21.6	50	50	100	130	0.40	170		
7/08/68			4.0	15.0	17.0	65	20	85	82	0.17	295		
8/19/68**	52		3.9	31.0	26.0	61	19	80	130	0.3	300		1.9
10/11/68	58		3.3	2.0	1.0	20	-	20	18	0.4	60		
11/26/68**	32		5.5	0	0	6	2	8	3.9	0.1	25		
8/31/70**	14°C	cfs .001	6.4	0	0	205	58	263	100	.8	340	120	2.3
11/24/70**	-	" .10	3.9	10	-	65	44	109	79	1.	270	-	7.
12/17/70*			6.0	-	0	31	6.6	37.6	87.4	1.2	190	11.	3.
01/18/71**	4°C	cfs .02	6.3	0	0	125	20	145	36	1.0	130	40	5.
01/25/71 A			3.9	70	17	68	32	100	38	.6	230	.	2.1
01/25/71 B			6.3	61	0	130	37	167	82	.4	190	20	1.6

-OH

A = Active Mine (Old Working)
B = Active Mine (New Working)
Samples collected by Mr. Fitzwater, Div. of Water Resources, W. Va. Dept. Natural Resources, and Don Phares DNR and analyzed by our agency (This applies to A & B Samples only)

**Sample collected and Analyzed by EPA

*Analyses made by EPA - Sample collected by DNR

STATE OF WEST VIRGINIA
MINE SEALING
MISCELLANEOUS

Date	Temp °F	GPM Flow	pH	Total Acid Cold	Total Acid Hot	Hardness Ca	Hardness Mg	Hardness Total	SO_4	Fe	Cond	Alkalinity as $CaCO_3$	Al
					FISHING HAWK #4								
10/11/68	54	3.0cfs	5.3	25	3	50	15	65	75	5.3	160		5.0
					RED RUN NO. 1 (Misc)								
11/26/68	7°C	.20	5.7			6	4	10	1.6	0	30		
					RED RUN AT MOUTH								
7/30/68	15°C	-	5.5	1	0	6	8	14	3.1	3.4	41		.4

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